

**ABSTRACT**

The field emission planar electron emitter device is disclosed that has an emitter electrode, an extractor electrode, and a planar emitter emission layer, electrically coupled to the emitter electrode and the extractor electrode. The planar electron emitter is configured to bias electron emission in a central region of the emission layer in preference to an outer region thereof. One structural example that provides this biasing is achieved by fabricating the planar emitter emission layer so that it has an outer perimeter that is thicker in depth than at an interior portion of the planar emitter emission layer, which reduces electron beam emission at the outer perimeter when an electric field is applied between the emitter electrode and the extractor electrode. The electric field draws emission electrons from the surface of the planar emitter emission layer towards the extractor electrode at a higher rate at the interior portion than at the outer perimeter. The planar electron emitter device further includes a focusing electrode electrically coupled to the planar electron emitter.

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